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MEPS-301(B)
M.E./M.Tech., III Semester
 Examination, June 2017
DSP and its Application
 (Elective-I)
 Time : Three Hours

Maximum Marks: 70

Note: i) Attempt any five questions out of eight.
 ii) All questions carry equal marks.

1. a) Find the cross correlation of $x(n) = (0.6)^n u(n)$ and $h(n) = (0.3)^n u(n)$.
 b) Write the expression for convolution sum of causal and non-causal systems excited by causal and non-causal inputs.
2. a) Prove that the sequences :
 i) $x(n) = a^n u(n)$
 ii) $x(n) = -a^n u(-n-1)$
 have the same Z-transform and differ only in the ROC.
 b) Find z-transform of the sequence.

$$x(n) = \left(\frac{1}{4}\right)^n \cos\left(\frac{\pi}{3}n\right) u(n)$$

Also sketch ROC. www.rgpvonline.com

3. a) Prove that :

$$n \cdot a^n u(n) \text{ have Z-transform } \frac{z}{(z-a)^2}$$

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- b) A causal system is represented by

$$H(z) = \frac{z+2}{2z^2-3z+4}$$

Find difference equation and the frequency of the system.

4. Discuss in detail all the properties of Discrete Fourier transform.
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5. a) Find the 4-point DFT of $x(n) = \{1, -1, 2, -2\}$ directly
 b) Find the IDFT of $X(R) = \{4, 2, 0, 4\}$ directly.
6. Discuss the method of the 8-point DFT using Radix-2 decimation in time FFT. Draw complete signal flow graph. What is bit reversal.
7. Design a Butter worth digital filter using the bilinear transformation. The specification of the desired low-pass filter are.

$$0.9 \leq |H(w)| \leq 1; 0 \leq w \leq \pi/2$$

$$|H(w)| \leq 0.2; \frac{3\pi}{4} \leq w \leq \pi$$

where T = 1 sec.

8. Write short notes on any two of the following:

- a) DSP applications.
- b) Digital signal processor
- c) Spectrum analyzer
- d) Design of FIR filter

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